

**ABSTRACT OF THE DISCLOSURE**

Regulatory elements responsible for tissue-specific transcriptional regulation of the human  $\beta_3$ -adrenergic receptor ( $\beta_3$ -AR) were identified. A region localized between -6.50 and -6.30 kb of the proximal promoter contained three sequences that act synergistically to achieve full transcriptional activity. One segment, termed 5 segment A, contains an Sp1 binding site. Another of the sequences, termed segment B, is a binding site for a *trans*-acting factor present in cells that constitutively express  $\beta_3$ -AR. In a specific embodiment, the *trans*-acting factor is expressed in neuroblastoma (SK-N- 10 MC) and brown adipose tissue cells, but little or not at all in CV-1, HeLa, or white adipose tissue cells. The third segment, C, is an S1 nuclease-sensitive site having CCTT repeats. Recombinant vectors under control of this transcriptional regulation region, particularly containing the B and C segments, provide a substrate for high throughput assays, such as reporter gene assays, to identify compounds that can increase the level of expression of  $\beta_3$ -AR. The B segment nucleic acids also provide for isolation and cloning 15 of the *trans*-acting factor. Mechanisms of transcriptional regulation and identification of other adjacent proteins involved in the regulation of the h $\beta_3$ -AR gene expression are provided.